Research Paper

Research on the Relationships among Classroom Climate, Self-Efficacy, and Learning Effectiveness

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ABSTRACT: *This study mainly aims to explore the relationship between classroom climate and learning effectiveness, and using self-efficacy as a mediating variable. Data were collected from the undergraduates of College of Economic and Management of University Z in China, of which 312 valid questionnaires were received. The research results suggest that (1) teacher support and peer relationship have respective significant positive effects on perceived self-efficacy; (2) teacher support and peer relationship have significant positive effects on subject knowledge and comprehensive ability respectively; (3) perceived self-efficacy has a significant positive effect on subject knowledge and comprehensive ability; (4) perceived self-efficacy plays a full mediating role in the relationship between classroom climate (teacher support, peer relationship) and learning effectiveness (subject knowledge, comprehensive ability).*
KEYWORDS: *Classroom Climate, Self-Efficacy, Learning Effectiveness*

I. INTRODUCTION

The classroom is an important environment where students can participate in academic learning activities. According to relevant studies on theories of motivation and students' learning activities, classroom climate is closely related to the learning environment and has a significant effect on students' classroom behavior (Djigic & Stojiljkovic, 2011), among which the classroom climate generated through the interaction between teachers and peers has a crucial effect (Adelman & Taylor, 2005). Therefore, firstly, how to make full use of the interaction between teachers and students to shape a positive classroom climate with mutual respect and support, communication and cooperative learning beneficial for learning objectives have become an important issue to ensure the quality of teaching and learning.

Secondly, learning effectiveness is an indicator not only to measure learners' learning outcomes but also to evaluate teaching quality. As students are embedded in the environment, the learning process and outcomes will inevitably be affected by the related factors to the classroom environment. This research will adopt the perspective of how individuals evaluate their own learning and attempt to explore students' perceptions of their degree of mastery in subject knowledge and comprehensive ability after a period of study in professional courses.

Thirdly, according to social cognitive theory, individuals are considered to have a cognitive self-regulation mechanism, whose core element is perceived self-efficacy, which significantly affects individual motivation and behavior (Bandura, 1982). In addition, self-efficacy is characterized by dynamic nature, and individuals' evaluation and judgment of perceived self-efficacy will change with the new information and experience that they have acquired (Torkzadeh & Van Dyke, 2001). As perceived self-efficacy is affected by the interaction between individual and environment (Bandura, 1986), individuals will continue the sense-making of various clues provided by the learning environment, which is likely to cause cognitive adjustment, thereby affecting their subsequent learning behavior.

Based on the above-mentioned discussion, this study will focus on classroom climate to explore its relationship with learning effectiveness, and using self-efficacy as an intermediary variable to make it more accurate to grasp the influence process and consequence of classroom climate on learning effectiveness.

II.   THEORICAL BACKGROUND AND HYPOTHESES

2.1. Classroom Climate and Self-Efficacy

Classroom climate, also known as "learning environment" (Adelman & Taylor, 2005), consists of the physical environment (such as space and facilities) as well as the process of interaction influence among class members (Shafritz, et al., 1995). Collective psychological traits or dispositions of class members are gradually formed in such a process of interaction influence, which in turn leads to a unique atmosphere different from other classes, which influences the concept and behavior pattern of each class member. So and Brush (2008) pointed out that the learning environment in the classroom refers to the atmosphere formed through the interaction between learners and teachers or between learners and other students. Such atmosphere will be perceived by teachers or students, and can directly affect the effectiveness of teachers' teaching and students' learning.

Although the previous studies indicated that the features of learning environment will have an effect on self-efficacy (e.g., Schunk & Hanson, 1985), students' perceptions of learning atmosphere are also likely to affect their self-efficacy beliefs. In other words, classroom climate is comprised of students' perceptions of their teachers and peers, while students' subjective interpretations of the learning environment also determine their reaction to the environment (Ames, 1992). It is pointed out in the social cognitive theory that self-efficacy is under the influence of how individuals interpret relevant information (Bandura, 1986). As perceived self-efficacy refers to students' subjective evaluation and belief regarding whether they can achieve their academic goals, as soon as individuals realize that their teachers or classmates in the classroom environment can provide help for their learning, their perception will be more conducive to guiding their learning behavior than the actual help provided by their teachers or classmates. Fast et al. (2010) suggested that the degree to which students perceive their classroom as a caring environment also has an important influence on self-efficacy. According to Murdock and Miller (2003), the students who can feel the concern from their teachers in classroom are more likely to believe that they have academic ability and set higher learning goals for themselves. In addition, if students can well interact with each other in the classroom, their confidence in achieving learning objectives can also be driven and promoted.

To sum up, this research suggests that the learning environment with a good learning relationship jointly established by teachers and students is believed to be able to enhance students' confidence and motivation to realize their learning goals. On the contrary, if students are unable to fully perceive the support and encouragement from teachers and peers in the learning process, and lack cooperation and trust, their self-efficacy in personal learning may be reduced. On this basis, the following hypotheses are put forward:

H1: Classroom climate has a significant positive impact on elf-efficacy.
H1-1: Teacher support has a significant positive impact on self-efficacy.
H1-2: Peer relationship has a significant positive impact on self-efficacy.

2.2. Classroom Climate and Learning Effectiveness

Adelman & Taylor (2005) argued that the highly cohesive and goal-oriented classroom climate will provide students with better learning opportunities for success. In the classroom, if teachers can exhibit a friendly and caring attitude toward students who encounter learning problems, encourage them to express themselves bravely, have complete understanding of their problems, and provide them with professional knowledge and emotional support, it will be of great help in improving students' subject knowledge and comprehensive ability (such as leadership, teamwork, thinking and analysis ability). Besides, Mize & Ladd (1990) revealed that students that have obtained the recognition of their peers are more likely to succeed in learning. Goodenow (1993) believes that a peer group with mutual support can be beneficial for individual learning. Accordingly, this study also holds that when there is a good relationship among peers who are willing to share their subject knowledge and exchange learning experience, it will be conducive to promoting the subject knowledge learning and comprehensive ability of individual students. According to previous studies, the classroom climate is closely related to students' academic achievement (Djigic & Stojiljkovic, 2011; Falsario et al., 2014), based on which the following hypotheses are put forward:

H2: Classroom climate has a significant positive impact on learning effectiveness.
H2-1: Teacher support has a significant positive impact on learning effectiveness.
H2-2: Peer relationship has a significant positive impact on learning effectiveness.

2.3. Self-Efficacy and Learning Effectiveness

Self-efficacy, an important motivation construct, can affect an individual's selection of tasks, goal commitment, and task performance (Gist & Mitchill, 1992; Taylor et al., 1984). According to social cognitive theory, self-efficacy has a powerful effect on achievement behavior (Bandura, 1986). Fast et al. (2010) pointed out that people with higher self-efficacy are proposed to have greater ambitions, stronger commitments to their goals, and quick recovery ability from setbacks than do those lower in self-efficacy. Several studies have found

that individuals with higher self-efficacy are more willing to invest more efforts than those with lower self-efficacy, and keep on overcoming difficulties and setbacks for a longer period of time to achieve the task goal (Bandura, 1986; Gist & Mitchell, 1992).

In this study, students with higher self-efficacy in the learning environment tend to be more willing to maintain a positive attitude of perseverance to overcome difficulties and actively solve problems than those with lower self-efficacy in subjects that are more difficult to learn. Therefore, students with higher self-efficacy are more likely to make a breakthrough in the face of adversity and perform better in terms of learning effectiveness. On the contrary, students with lower self-efficacy are less confident about realizing their learning goals and may hold a negative attitude toward the problems they may face in their study, resulting in low learning effectiveness. Accordingly, the following hypotheses are put forward:

H3: Self-efficacy has a significant positive impact on learning effectiveness.

H3-1: Self-efficacy has a significant positive impact on the learning of subject knowledge.

H3-2: Self-efficacy has a significant positive impact on the learning of comprehensive ability.

2.4 Self-Efficacy as a Mediator

According to relevant empirical studies, in the face of growing task complexity and difficulty, individuals' self-efficacy will affect their ability to acquire and transfer knowledge and skills, in addition, it can predict future performance better than the performance in the past (Kozlowski et al., 2001).

Based on the source of self-efficacy (Bandura, 1982), this study argues that if teachers can keep providing successful experience, guidance, and support for students in the process of classroom learning, students' self-confidence in achieving learning goals can be strengthened, which will contribute to enhancing their learning effectiveness. Secondly, for students with poor academic performance who can well interact with their classmates, they are also able to imitate similar behaviors and enhance their perceived self-efficacy through observing their peers' successful experiences, which is likely to be beneficial to promote their learning motivation. Thirdly, if teachers could often give oral positive feedback or encouragement to students for their good learning performance in the process of learning, which will enable students to be firmly sure to have the ability to achieve learning goals and the willingness to overcome obstacles, students may establish their perceived self-efficacy, thereby enhancing their learning motivation. Fourthly, the support and assistance between teachers and students in the classroom can reduce students' negative emotions in their study (such as tension, anxiety), which will be helpful in strengthening students' self-efficacy and enhancing their learning effectiveness. Therefore, the following hypotheses are put forward:

H4: Self-efficacy has a mediating effect on the relationship between classroom climate and learning effectiveness.

H4-1: Self-efficacy has a mediating effect on the relationship between teacher support and subject knowledge.

H4-2: Self-efficacy has a mediating effect on the relationship between teacher support and comprehensive ability.

H4-3: Self-efficacy has a mediating effect on the relationship between peer relationship and subject knowledge.

H4-4: Self-efficacy has a mediating effect on the relationship between peer relationship and comprehensive ability.

III. RESEARCH METHODS

3.1 Sample and Procedures

The data were collected from undergraduates of College of Economic and Management of University Z in China, which of 415 questionnaires distributed, 312 were valid, representing a 72.8% response rate. Among all the respondents, female students account for 74%; students from rural areas account for 57.7%, and juniors and seniors account for 55.3% and 34.3% respectively.

3.2. Common Method Variance Analysis

Considering that the respondents of all the questionnaires in this study were all students, it is prone to the occurrence of common method variance (CMV) due to the single source of respondents. Therefore, after all of the questionnaires were received, Haman's single-factor post hoc analysis (Podsakfoff, et al., 2003) was further conducted to detect whether common method variance is likely to happen. All the items from every construct were entered into principal component factor analysis, and check the unrotated factor solution, and examine it to assess the number of factors that could cause the variance in the variables (Tehseen, et al., 2017). The analysis result shows that seven factors were extracted through unrotated principal component factor analysis and the explained variance of the first factor accounts for 31.67% ($< 50\%$), this means that CMV is not a serious problem in the study (Mattila & Enz, 2002).

3.3. Measures

Classroom climate was assessed using Huang's (2004) 11-item scale, which consist of two dimensions: (1) teacher support: it refers to teachers' attitude towards students as well as their learning status, containing a total of 5 items (α=0. .842); (2) peer relationship: it refers to the status of students' cooperative learning and attitude in the classroom learning, containing a total of 6 items (α = 0.815).

Self-efficacy was measured with the 8item New General Self-Efficacy (NGSE) scale developed by Chen, Gully, and Eden's (2001). NGSE presents only a single dimension (α=0.878). Self-efficacy refers to individuals' overall confidence in whether they can effectively cope with the learning environment.

The Undergraduate Learning and Development Survey Scale developed by the University Development Research Center of Huazhong University of Science and Technology (2014) is used to measure the *learning effectiveness*, mainly containing the following two dimensions based on the research objective of this study: (1) subject knowledge: it refers to students' mastery of subject knowledge in the process of learning, containing a total of 5 items (α = 0.859); (2) comprehensive ability: it refers to the degree to which students have improved their non-cognitive skills in the process of learning (such as time management, teamwork, thinking and analysis ability), containing 6 items in total (α = 0.848).

IV.   RESULT

In this study, Structural Equation Modeling (SEM) is used to verify the research hypotheses with a two-step approach (Hair et al., 2011). In the first stage, it is about the analysis of the measurement model. In the second stage, it aims to verify the structural model.

4.1 The Measurement Model

In this study, confirmatory factor analysis (CFA) is used to measure the validity and reliability of all constructed items. First of all, as shown in Table 1. (1) Cronbach's α values all exceed 0.7, indicating that there is good internal consistency among the items of each dimension (Nunnally & Bernstein, 1994). (2) The construction reliability (CR) is between 0.843 and 0.890 (> 0.6). (3) In terms of the measurement of convergent validity, the average variance extracted (AVE) of each latent construct is greater than 0.5 (Fornell & Larcker, 1981). (4) In terms of the measurement of discriminant validity, the AVE for each latent construct exceeds the respective squared correlation (Fornell & Larcker, 1981). The data above-mentioned all exceed the recommended value, indicating that the measurement model in this study has good reliability, discriminant validity, and convergent validity.

Table 1. Descriptive Statistics, Reliability, and Validity of The Research Constructs

	Cronbach's α	C.R.	AVE	1.	2.	3.	4.	5.
1. TS	0.842	0.846	0.526	**0.725**				
2. PR	0.815	0.843	0.518	0.604**	**0.719**			
3.SE	0.878	0.890	0.506	0403**	0.316**	**0.711**		
4.SK	0.859	0.861	0.555	0.425**	0.390**	0.546**	**0.745**	
5.CA	0.848	0.850	0.531	0.377**	0.331**	0.572**	0.658**	**0.729**

Note: TS= teacher's support; PR= peer relationship; SE= self-efficacy; SK= subject knowledge; CA= comprehensive ability; C.R.= construct reliability; AVE= average variance extracted; The square root of AVE is displayed in bold on the diagonal of the matrix.

4.2 The Structural Model

First of all, as shown in Figure 1, the overall fit of structural model is good ($\chi2$=642.48, $\chi2$/df =1.88, CFI= 0.915, GFI= 0.862, NNFI= 0.904, RMSEA= 0.055). In the meantime, the hypotheses put forward in this study are verified through the path analysis of structural model. As shown in Figure 1, teacher support and peer relationship have significant positive effects on students' individual self-efficacy respectively (β= 0.35, t= 3.40; β= 0.32, t= 3.19). Thus, H1-1 and H1-2 were supported.

Secondly, teacher support and peer relationship also have significant positive effects on the learning of subject knowledge (β = 0.27, t = 2.98; β = 0.25, t = 2.74) and comprehensive ability (β = 0.26, t = 2.93; β = 0.21, t = 2.38) respectively, thus supporting H2-1 and H2-2.

In addition, self-efficacy also has a significant positive effect on the learning of subject knowledge and comprehensive ability (β= 0.35, t= 4.56; β= 0.41, t= 5.12). Thus, H3-1 and H3-2 were also supported.

χ^2=642.48, χ^2/df =1.88, CFI= 0.915, GFI= 0.862, NNFI= 0.904, RMSEA= 0.055; *t* value in brackets
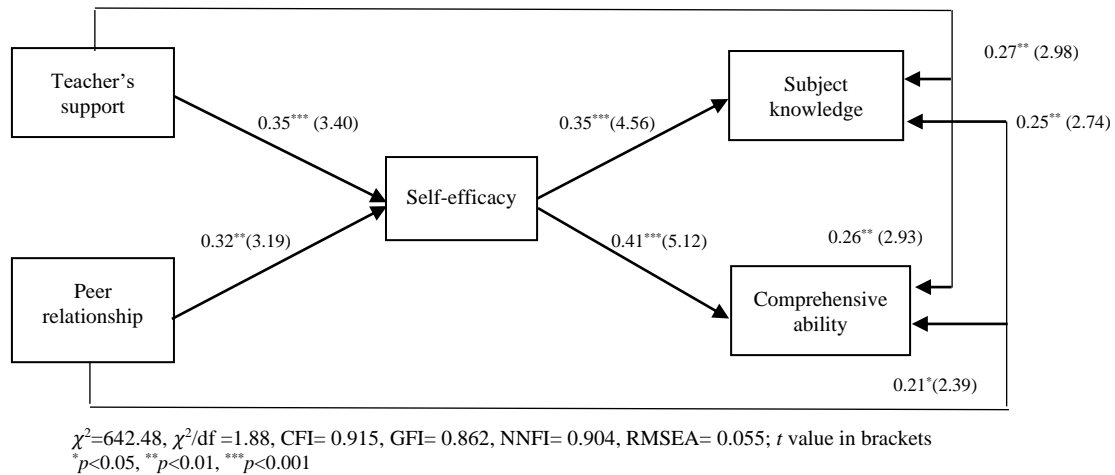*p<0.05, **p<0.01, ***p<0.001

Figure 1. Hypothesized Model with Path Coefficients

In addition, to verify the mediating role of perceived self-efficacy in the relationship between classroom climate and learning effectiveness, the Bias-Corrected Bootstrap method and the 95% confidence interval (CI) are adopted to test the total effect, indirect effect, and direct effect respectively. Moreover, whether the interval between the lower bounds and the upper bounds of the confidence limit includes zero value is taken as the criterion to judge the intermediate effect. As shown in Table 2, in terms of the test of the total effect, the limit value of confidence interval of all influencing paths does not include zero. Secondly, the limit value of confidence interval of the indirect effect of each path does not include zero, while in terms of direct effect, the limit value of confidence interval includes zero. On the basis of these data, self-efficacy plays a fully mediating role in the relationship between classroom climate (teacher support, peer relationship) and learning effectiveness (subject knowledge, comprehensive ability). Thus, H4-1-H4-4 were supported.

Table 2. The Path Analysis of The Mediating effect of Self-Efficacy

Effect / Path	Total effect		Indirect effect		Direct effect	
	Lower bounds	Upper bounds	Lower bounds	Upper bounds	Lower bounds	Upper bounds
TS→PSE→SK	0.140	0.310	0.068	0.401	-0.028	0.923
TS→PSE→CA	0.228	0.503	0.115	0.511	-0.017	0.465
PR→PSE→SK	0.116	0.847	0.061	0.299	-0.027	0.068
PR→PSE→CA	0.093	0.684	0.083	0.408	-0.093	0.687

Note: TS= teacher's support; PR= peer relationship; SE= self-efficacy; SK= subject knowledge; CA= comprehensive ability

V. DISCUSSION

This study aims to explore the relationship between classroom climate and learning effectiveness and to verify the mediating role of perceived self-efficacy in the relationship between the two. The research results show that teachers hold a highly serious and supportive attitude towards students' learning and that students can well interact with each other, it will not only be conducive to improving students' self-confidence in achieving their learning goals but also to enhancing students' ability in mastering subject knowledge, self-expression, teamwork and time management.

Accordingly, teachers should make great efforts to create a positive and open learning atmosphere in classroom, and assist students in establishing a sound learning relationship, so that teachers and students can exchange the learning idea and content with each other in classroom, Moreover, doing by this way can also promote the members' cohesion in learning motivation, enhance students' confidence in achieving their academic goals, expand their subject knowledge and comprehensive ability. Only in this way, can it be possible to effectively ensure the quality of teaching and learning.

VI.   RESEARCH LIMITATIONS AND FUTURE RESEARCH

The current study has some limitations that need to be mentioned. Firstly, the research object of this study is limited to the students from the College of Economics and Management of University Z, as a consequence, the research results may only be applicable to the university. Therefore, there are great limitations in terms of external validity. Secondly, in the process of data collection, some students may have a negative and defensive attitude toward answering certain questions. Therefore, students may fill in the questionnaires at will, which is likely to cause biases in the analysis of the research results.

In the end, it is feasible to add such situational variables as teachers' teaching strategies and class cohesion to future research. The cross-level research design can enable the inference and analysis of the influence relationship among the variables at different levels to be more accurate. In addition, it is also necessary to conduct a comparative analysis with students from other universities studying in the same/similar major, which can not only establish the validity of this study but also better master the existing problems and differences.

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